

A REVISION OF *MELALEUCA* L. (MYRTACEAE) IN NORTHERN AND EASTERN AUSTRALIA, 1.

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Summary

Diagnoses are given for eleven new species, five new varieties and two new forms of *Melaleuca* including *M. arnhemica*, *M. biconvexa*, *M. brassii*, *M. cornucopiae*, *M. densispicata*, *M. kunzeoides*, *M. pallescens*, *M. parvistaminea*, *M. punicea*, *M. sericea*, *M. tortifolia*, *M. nervosa* f. *latifolia*, *M. nervosa* f. *pendulina*, *M. stenostachya* var. *pendula*, *M. styphelioides* var. *quanoiphloia*, *M. viminalis* var. *minor*, *M. viridiflora* var. *canescens* and *M. viridiflora* var. *attenuata*. New combinations *M. viminalis* based on *Metrosideros viminalis* Sol. ex Gaertner, *M. viridiflora* var. *glabra* based on *M. cunninghamii* Schauer var. *glabra* C. White and *M. viridiflora* var. *angustifolia* based on *M. leucodendra* L. var. *angustifolia* L. f. are made. *M. erubescens* Otto is a synonym of *M. diosmatifolia* Dum-Cours. A key to all species and infra-specific taxa is provided. Descriptions and distributions of six of the 61 species treated in the key are given. The remaining species will be treated in succeeding papers of this series.

As a result of a review of *Melaleuca* in eastern and northern Australia undertaken as part of flora projects in progress at the Queensland Herbarium (BRI), 11 undescribed species and a number of infraspecific taxa were recognised. Some nomenclatural problems were also investigated.

Melaleuca is the second largest genus in Myrtaceae after *Eucalyptus* in Australia, comprising at least 150 species, but it has received comparatively little attention since the treatment by Bentham (1866). Cheel in various papers between 1916 and 1938 reviewed some of the problems within the genus and Blake (1968) revised the *M. leucadendra* group and its allies. More recently Carrick & Chorney (1979) reviewed the genus in South Australia.

The genus is revised for the area including the Pilbara and Kimberley areas of Western Australia, the whole of Northern Territory, Queensland, New South Wales, Victoria and Tasmania. The south-western part of Western Australia has the greatest concentration of species. The genus in this area is in need of revision but will require extensive local field experience to be effective.

This is the first of a series of papers. All new names that appear in the key are validated in the appendix (p.74).

Melaleuca L.

Type: *M. leucadendra* (L.) L. (*Myrtus leucadendra* L.) (typ. cons.)

Shrubs or trees. Bark usually of numerous, thin, paper-like, corky layers, sometimes scaly or hard and furrowed. Leaves opposite, sub-opposite, scattered or rarely spirally arranged or whorled, entire, terete or flat, concave or sometimes with recurved margins, one to many longitudinal veins, often obscured, punctate, sometimes obscurely so, sessile, peltate or petiolate; petiole-lamina demarcation often poorly defined. Inflorescences terminal or axillary spikes, heads, clusters or rarely racemes, dense, open or distant, the rachis growing out before or after anthesis or not at all. Flowers perfect or male, white, yellow-green, yellow, pink, red or purplish, sessile or shortly pedicellate, 1–3 subtended by bract (sometimes leaf) usually caducous, rarely absent, with or without bracteoles. Calyx tube hollow, turbinate, campanulate or more or less urceolate, adnate to ovary at base, lobes 4 or absent, herbaceous and/or scarious, sometimes confluent, deciduous, persistent or semipersistent. Petals 5, concave, usually with a short claw. Stamens numerous, longer than petals, glabrous or pubescent; filaments in the lower part united into short or long, flat or terete claw opposite the petals or sometimes confluent forming a ring, their upper part free, filiform, arranged variously on the margins and sometimes the inner surface of the claw; anthers

versatile; cells parallel, dehiscent longitudinally. Ovary enclosed in calyx tube, inferior or semi-inferior, 3-celled, summit convex with central depression at base of style, usually pubescent; ovules numerous on peltate placentas; style glabrous or thinly pubescent; stigma peltate, capitate or small. Fruit small, sessile or very shortly pedicellate, sometimes embedded in thickened stem, capsules embedded in enlarged, often woody, calyx tube, opening loculicidally at summit into three valves; seeds linear, numerous.

Over 150 species, mainly Australian also New Caledonia, New Guinea and Malesia; many cultivated.

Melaleuca is distinguished from related genera with capsular fruit on staminal characters, inflorescence structure and ovule number. In *Melaleuca* the stamens are longer than the petals and this character is used to separate it from many genera. *Sinoga* which is closely related to members of the series *Circumscissae*, as defined by Bentham, differs only in having stamens shorter than the petals. The genera *Calothamnus*, *Eremaea*, *Regelia*, *Phymatocarpus* and *Beaufortia* lack the versatile anthers of *Melaleuca* but otherwise are very similar.

Both *Kunzea* and *Callistemon* differ from *Melaleuca* in the stamens being free, and this is the only consistent character separating the genera. As there is considerable variation in the degree of fusion of staminal filaments within the genus it was suggested by Mueller, Dawson and others that *Callistemon* and *Melaleuca* be united. However, as similar minor characters have been used to differentiate other genera in Myrtaceae, the fusion of the stamens is regarded as sufficient to distinguish *Melaleuca* from its relatives. Brown in the protologue of *Callistemon* described the stamens as distinct and in order to retain this as a constant character throughout the genus, *Metrosideros viminalis* (*Callistemon viminalis*) is transferred to *Melaleuca*. The stamens in this species, are variable in the degree they are united and in many specimens, including the type, they are united to a greater extent than in many species currently referred to *Melaleuca*. *Lamarchea* is recognised by its zygomorphic staminal tube while other capsular-fruited genera with long fused stamens differ in their inflorescence structure or in having a single seed in each loculus.

Within *Melaleuca* there are a number of recognisable groups such as the *Circumscissae* and *Peltatae* of Bentham, and the allies of *M. leucadendra* as defined by Blake. Many smaller groups can be recognised but many species do not appear to belong to any clearly defined group and some species are intermediate between major groups. The critical evaluation of infra-generic taxa cannot be made without investigation of the great concentration of species in south-western Western Australia.

Plants of *Melaleuca* are evergreen, commonly retaining their leaves for two years or more, depending on the species and environmental factors. Most species have some indumentum on the young leaves. This may be caducous or persistent. Because of the length of time the leaves are retained eventually most species become glabrous. For those that retain their indumentum for at least one growth period before becoming glabrous, the indumentum is regarded here as being semi-persistent. A similar situation exists in relation to calyx lobes where the fruit can be retained for several years. Some species lose their calyx lobes shortly after anthesis and these lobes are treated here as being deciduous. In others the lobes become thick and woody and are truly persistent, while others retain the lobes for various periods before they are either eroded or fall as a result of continued growth of the fruit. These are considered to be semi-persistent. Within the young inflorescences each bract subtends either a single bud or a triad of buds. In most taxa the arrangement of buds is consistently single or in triads, rarely mixed, but commonly by anthesis the bracts have fallen and the flowers are so closely packed that the arrangement cannot be distinguished. Flower colour can be very variable in some species, ranging from dark red to yellow, white, green or sometimes mauve, while in other taxa the colour is very consistent and can be used as an aid to identification. However, flower colour, if not supported by other morphological differences, is not sufficient to separate otherwise similar taxa.

The staminal bundles of *Melaleuca* are of considerable diagnostic value because of the range of morphological differences they display. The claw in many cases can be seen to be the fused or cohering bases of the filaments but in other taxa the structure is much more complex. The free parts of the filaments may be attached in one or two rows to whole or part of the margin, or to the margin and inner surface, or only to the apex of the claw.

KEY TO SPECIES AND INFRASPECIFIC TAXA

New names are validated in the appendix (p.74).

1. Leaves less than 5 mm long, peltately attached 2
 Leaves mostly more than 5 mm long and not peltately attached 7
2. Leaves opposite or subopposite 3
 Leaves alternate or scattered 4
3. Branchlets hairy, deeply excavated beneath the leaves 1. **M. foliolosa**
 Branchlets glabrous, not deeply excavated beneath the leaves 2. **M. minutifolia**
4. Branchlets deeply excavated beneath the leaves; leaves stem-clasping 5
 Branchlets not deeply excavated; leaves not stem-clasping 6
5. Flowers red; inflorescence globose 3. **M. punicea**
 Flowers white; inflorescence elongate 4. **M. tamariscina**
6. Flowers cream to white; bark papery 5. **M. irbyana**
 Flowers mauve, fading to cream; bark hard 6. **M. pallescens**
7. Leaves mostly opposite or subopposite 8
 Leaves scattered, alternate or irregularly arranged including whorled and
 sometimes a few opposite pairs 21
8. Stamens and style more than 20 mm long 7. **M. hypericifolia**
 Stamens and style less than 20 mm long 9
9. Flowers in spikes, terminal, subterminal or in the upper axils 10
 Flowers in heads, clusters or if in spikes then in the lower axils 16
10. Staminal claw 4–15 mm long, each with more than 30 filaments 8. **M. linariifolia**
 - a. Staminal claw usually more than 8 mm long; fruit usually cylindrical with
 included valves var. **linariifolia**
 - Staminal claw usually less than 8 mm long; fruit usually turbinate with
 exserted valves var. **trichostachya**
 - Staminal claw to 3 mm long, each with less than 25 filaments 11
11. Leaves 5–7–veined, broadly cordate at base 9. **M. squarrosa**
 Leaves 3–veined (sometimes obscured), cuneate or attenuate at base 12
12. Leaves keeled below, convex above on both sides of midvein 10. **M. biconvexa**
 Leaves not keeled below, flat or concave above 13
13. Leaves linear to linear ovate, less than 2 mm wide 14
 Leaves broadly elliptical or broadly ovate, more than 2 mm wide 15
14. Inflorescence few flowered 11. **M. halmaturorum**
 Inflorescence a many-flowered dense spike 16. **M. densispicata**
15. Leaves elliptical; rachis of inflorescence pubescent 12. **M. cheelii**
 Leaves ovate; rachis of inflorescence villous 13. **M. tortifolia**
16. Fruit becoming embedded in thickened rachis; calyx lobes deciduous 17
 Rachis not thickened, fruit not embedded in it; calyx lobes persistent, or
 semipersistent 18
17. Leaves broadly ovate to obovate, keeled; venation visible 14. **M. gibbosa**
 Leaves narrowly obovate to linear, not keeled; venation not visible 15. **M. decussata**
18. Inflorescence a many-flowered spike with woolly rachis 16. **M. densispicata**
 Inflorescence a few-flowered head, cluster or short spike with glabrous or shortly
 pubescent rachis 19

19. Leaves linear-triangular, mostly sessile; stamens usually more than 10 mm long 17. **M. wilsonii**
 Leaves ovate or elliptic, petiolate; stamens usually less than 10 m long 20
20. Flowers in clusters on older branchlets; rachis of inflorescence very short or absent;
 filaments less than 20 on each claw 18. **M. acuminata**
 Flowers usually in a short spike; filaments 40–60 on each claw 19. **M. thymifolia**
21. Flowers in clusters often on older branchlets; oil glands prominent in two rows on
 lower leaf surface 20. **M. neglecta**
 Flowers not in clusters on older branchlets; oil glands randomly dispersed, usually
 not prominent 22
22. Inflorescence a head, rachis rarely growing out to produce a leafy branchlet 23
 Inflorescences various, rachis growing out to produce a branchlet, at least in
 perfect-flowered inflorescences 28
23. Inflorescences terminal on leafy branches 24
 Inflorescences mostly axillary, sometimes terminal on leafless axillary branchlets 26
24. Inflorescence 3–8-flowered; capsule valves distinctly exerted above circumscissid
 calyx tube 21. **M. angustifolia**
 Inflorescence 10–40-flowered; capsule valves about level with top of
 circumscissid calyx tube 25
25. Inflorescence 3–6 cm diam.; stamens more than 12 mm long 22. **M. magnifica**
 Inflorescence less than 3 cm diam.; stamens less than 8 mm long 23. **M. arnhemica**
26. Calyx tube not circumscissid; flowers white 24. **M. acacioides**
 Calyx tube circumscissid; flowers red or orange 27
27. Filaments less than 20 on each claw; flowers usually orange 25. **M. symphyocarpa**
 Filaments 30–50 on each claw; flowers red 26. **M. brassii**
28. Calyx lobes absent; flowers opening markedly centripetally 27. **M. cornucopiae**
 Calyx lobes present; flowers opening almost simultaneously 29
29. Flowers in heads on short peduncle-like branchlets, leaves linear or terete 30
 Flowers variously arranged, if in heads not on peduncle-like branchlets,
 leaves various 32
30. Calyx lobes pubescent; leaves with semi-persistent pubescence 28. **M. glomerata**
 Calyx lobes glabrous; leaves sericeous and glabrescent or glabrous 31
31. Leaves with curved, cuspid tips; usually virgate shrubs 29. **M. uncinata**
 Leaves with straight cuspid tips; not usually virgate shrubs 30. **M. nodosa**
32. Stamens hairy 31. **M. lasiandra**
 Stamens glabrous 33
33. Leaves flat, petiolate, more than 2 cm long, mostly 5- or more veined; inflor-
 escences more than 2 cm long, terminal, subterminal or upper axillary; flowers
 in triads 34
 Characters not as or combined as above. Either leaves sessile or subsessile, or inflor-
 escences less than 2 cm long or flowers single or in pairs 41
34. Leaf indumentum consisting of short crispid or curved hairs, at least on young
 leaves, with few or numerous long straight hairs 35
 Leaves glabrous or with straight hairs only 36
35. Stamens less than 10 mm long, usually more than 25 per flower 33. **M. dealbata**
 Stamens to 20 mm long, less than 25 per flower 32. **M. nervosa**

- a. Leaves wide usually 2–4 times long as wide; apex usually abruptly narrowed f. **latifolia**
 Leaves narrow, more than 4 times long as wide; apex tapered b
- b. Shrubs with erect branchlets, leaves thick f. **nervosa**
 Trees with pendulous branchlets, leaves thin f. **pendulina**
36. Inflorescences less than 2 cm wide; fruiting capsules to 2.5 mm long 37
 Inflorescences more than 2 cm wide; fruiting capsules usually more than 2.5 mm long 38
37. Leaves sericeous; indumentum semi-persistent; staminal claw 2–2.5 mm long 35. **M. sericea**
 Leaves glabrescent early; staminal claw less than 1.5 mm long (*M. dealbata* (glabrous form) and *M. saligna* may key out here) 34. **M. stenostachya**
 a. Branchlets erect; leaves usually less than 10 mm wide and 10 cm long
 var. **stenostachya**
 Branchlets pendulous; leaves usually less than 10 mm wide, if narrower than more than 10 cm long var. **pendula**
38. Inflorescence 20–25 mm wide, indumentum when present on young branchlets patently villous 36. **M. cajuputi**
 Inflorescence more than 25 mm wide; branchlets glabrous or with appressed pubescence . 39
39. Leaves thin, usually wider at or below middle, glabrous or glabrescent very early; branchlet thin, pendulous; inflorescence open to distant with glabrous rachis
 38. **M. leucadendra**
 Characters not as or combined as above. Either leaves thick or leaves sericeous or branchlets erect or inflorescence dense or with pubescent rachis 40
40. Leaves thin, sericeous at first; branchlets thin, pendulous; stamens to 14 mm long
 37. **M. argentea**
 Leaves stiff, usually thick, appressed pubescent or glabrous; branchlets mostly thick and erect; stamens more than 15 mm long 39. **M. viridiflora**
 a. Leaves with persistent appressed pubescence, canescent var. **canescens**
 Leaves glabrous or glabrescent early b
 b. Rachis of inflorescence and calyces densely pubescent, leaves thick, mostly more than 2.5 cm wide, glabrescent var. **viridiflora**
 Characters not as or combined as above. Either rachis of inflorescence and calyces glabrous, or leaves mostly less than 2.5 cm wide c
 c. Leaves mostly more than 2.5 cm wide, glabrous; all parts of inflorescence glabrous var. **glabra**
 Leaves mostly less than 2.5 cm wide, glabrous or glabrescent; inflorescence glabrous or pubescent d
 d. Leaves thick, commonly more than 10 cm long; inflorescence usually glabrous var. **attenuata**
 Leaves thin but stiff, mostly less than 10 cm long; inflorescence usually pubescent var. **angustifolia**
41. Leaves sessile, commonly pungent, mostly with 5–30 veins, sometimes obscure 42
 Leaves petiolate (sometimes very short), rarely pungent, 1–7 veins, sometimes obscure ... 43
42. Bark hard, fissured; petals without claws; leaves with 5–11 veins 40. **M. bracteata**
 Bark layered, papery or scaly; petals clawed; leaves with 15–30 veins ... 41. **M. styphelioides**
 a. Bark papery, calyx lobes tapered, usually more than 2 mm long; filaments usually less than 20 on each claw var. **styphelioides**
 Bark scaly; calyx lobes shortly acuminate, less than 2 mm long; filaments commonly more than 20 on each claw var. **squamophloia**
43. Leaves more than 3 mm wide 44
 Leaves less than 3 m wide 49
44. Inflorescences globose or short spikes; staminal filaments 5–9 on each claw; leaves mostly 5– or more veined 45
 Inflorescences elongated spikes; staminal filaments 6–28 on each claw; leaves usually 3–veined 46

45. Inflorescences terminal; leaves usually broadly obovate to elliptical, obtuse ... 43. **M. arcana**
 Inflorescences axillary and terminal; leaves narrowly obovate, acute 44. **M. saligna**
46. Flowers red, staminal filaments 6–11 on each claw or filaments sometimes fused
 at base into a ring 42. **M. viminalis**
 a. Calyx shortly pubescent or glabrous; staminal bundles distinct; leaves
 usually more than 8 mm wide var. **viminalis**
 Calyx villous; staminal bundles often reduced to a fused ring of stamens;
 leaves usually less than 8 mm wide var. **minor**
 Flowers white; staminal filaments 11–28 on each claw 47
47. Calyx tubes glabrous; rachis of inflorescence glabrous or puberulous 45. **M. groveana**
 Calyx tubes and rachis of inflorescence villous or pubescent 48
48. Calyx tube 4–5 mm long; fruit 7–8 mm long 46. **M. deanei**
 Calyx tube 2–3 mm long; fruit 3–5 mm long 47. **M. sieberi**
49. Calyx tube thin, not thickened in fruit; flowers shortly pedicellate 48. **M. kunzeoides**
 Calyx tube thickened in fruit; flowers sessile 50
50. Staminal claw more than 5 mm long 51
 Staminal claw to 4 mm long 52
51. Inflorescences borne on lower axillary branchlets; bracts to 14 mm long, tapered;
 bark corky or hard 49. **M. armillaris**
 Inflorescences terminal, subterminal or on upper axillary branchlets; bracts
 shorter; bark layered, papery 50. **M. alternifolia**
52. Style thinly pubescent 51. **M. decora**
 Style glabrous 53
53. Style to 2 mm long; free part of filaments to 1.5 mm long 52. **M. linophylla**
 Style 3–8 mm long; free part of filaments more than 2 mm long 54
54. Flowers pink; leaves terete or only flattened towards tip, about 0.5 mm diam.
 53. **M. diosmatifolia**
 Flowers white, yellow or purple-pink; leaves flat or concave below, usually more
 than 1 mm wide 55
55. Calyx tube 1–2 mm long; leaves to 1.5 mm wide 56
 Calyx tube 2–3 mm long; leaves 1–3 mm wide 58
56. Stamens less than 4 mm long 54. **M. parvistaminea**
 Stamens more than 5 mm long 57
57. Stamens yellow with 5–7 filaments on each claw; oil glands large, often raised on
 calyx and leaves 55. **M. pustulata**
 Stamens white with 7–13 filaments on each claw; oil glands small, not raised
 56. **M. ericifolia**
58. Bracts persistent till after anthesis, 3–5 veined; flowers purple-pink; filaments 4–9
 on each claw 57. **M. squamea**
 Bracts absent or caducous, not 3–5 veined; flowers white or yellow; filaments
 more than 8 on each claw 59
59. Calyx pubescent or villous; free part of filaments to 8 mm long 60
 Calyx glabrous, sometimes puberulous; free part of filaments to 5 mm long 61
60. Branchlets, calyx and flowering rachis villous; fruit 5–6 mm long 58. **M. capitata**
 Branchlets, calyx and flowering rachis pubescent; fruit 3–5 mm long 57. **M. sieberi**
61. Staminal claw 3–4 mm long with 15–30 filaments on each claw 59. **M. dissitiflora**
 Staminal claw 1–1.5 mm long with 8–14 filaments on each claw 62

62. Inflorescences usually leafy with flowers in triads; fruit ovoid to urceolate
60. *M. lanceolata*
Inflorescence not leafy; flowers single, fruit cylindrical (Lord Howe I. only)
61. *M. howeana*

1. *M. foliolosa* Cunn. ex Benth., Fl. Aust. 3:162 (1867). **Type:** Queensland, Cape Flinders, *A. Cunningham* (BM).

Shrub or small tree to 7 m high. Bark compact, layered, papery. Branchlets woolly, deeply excavated under leaves. Leaves opposite, sessile, peltately attached, concave, broadly angular-elliptical, scale-like, acute, obtuse at base, 2–3 mm long, *ca* 1 mm wide, glabrous, sometimes with ciliate margins, 5–veined, obscure, oil glands obscure. Inflorescence a few flowered terminal spike; flowers single; rachis woolly, growing out before anthesis; bracts and bracteoles semipersistent, broadly triangular, 1–2 mm long, striate. Calyx tube cylindrical, 1–1.5 mm long and wide, glabrous; lobes semicircular, about 0.5 mm long, striate with thin ciliate margin, glabrous. Petals white, circular, clawed, about 2 mm diam., striate. Stamens white, glabrous; claw 3–5 mm long; filaments 20–30 attached to margin and inner surface of upper third of each claw, free part to 2 mm long. Style 1–2 mm long, glabrous, stigma small. Ovary *ca* 0.5 mm long, woolly above. Fruit, campanulate to nearly spherical, 4–5 mm long and wide, orifice to 2 mm diam., calyx lobes deciduous, usually few in an open spike. **Map 1.**

Queensland: Cape York Peninsula north of about 19°S.

Selected specimens. COOK DISTRICT: Wenlock, Batavia River, Jul 1927, *Brass* 19716 (BRI); near Morhead R., 15°00'S, 143°45'E, Jun 1971, *Hyland* 5188 (BRI); Laura, 15° 34'S, 144° 27'E, Nov 1965, *Pedley* 1858 (BRI); 8 [18 km] miles E of Forseyth, Jul 1953, *Perry* 3842 (BRI).

2. *M. minutifolia* F. Muell., Trans. Phil. Inst. Vic. 3:45 (1859); Benth., Fl. Aust. 3:162 (1867); Carrick & Chorney, J. Adelaide Bot. Gard. 1:301, f. 13 (1979). **Type:** North Western Australia (Victoria River) (MEL).

Shrub or small trees to 7 m high. Bark compact, layered, papery. Branchlets glabrous, excavated at nodes. Leaves opposite, sessile, peltately attached, obovate, scale-like, concave, acuminate, truncate at base, 1–3 mm long, to 1 mm wide, glabrous, 5–9 veined, sometimes obscure, oil glands usually obscure. Inflorescence a few flowered terminal or subterminal spike; flowers single; rachis glabrous growing out at or after anthesis; bracts semipersistent, broadly triangular, about 1.5 mm long, striate; bracteoles semipersistent, ovate, about 1 mm long, keeled. Calyx tube campanulate, about 1.5 mm long and wide, glabrous; lobes semi-elliptical, about 0.5 mm long, striate, glabrous. Petals, white, ovate, clawed, to 1.5 mm long. Stamens white, glabrous; claw 2–3 mm long; filaments 8–15 attached to margins and inner surface near apex of each claw, free part to 4 mm long. Style about 5 mm long (reduced in male flowers) glabrous; stigma small. Ovary *ca* 0.5 mm long, woolly at apex. Fruit, ovoid, campanulate to urceolate, 2–3 mm long and wide, orifice 1–1.5 mm diam., calyx lobes semi-persistent, single or few in an open spike. **Map 2.**

Northern Australia: Kimberley area of Western Australia, Northern Territory and Cape York Peninsula, Queensland.

Selected specimens. Western Australia: 11 miles [18 km] E of 'Gibb River' Station, Sep 1954, *Speck* 4995 (BRI, CANB). Northern Territory: Near Katherine, 14° 22'S, 132° 23'E, Oct 1946, *Blake* 17218 (BRI); 12 miles [19 km] SSE of 'Willeroo' Station, Jun 1949, *Perry* 2051 (BRI); Queensland: 1.3 miles [2 km] S of Chewko turnoff, Mareeba-Atherton Rd., Jan 1962, *Webb & Tracey* 5545 (BRI).

3. *M. punicea* Byrnes, sp. nov. (see p.74).

Shrub to 3 m high, spreading. Bark hard, layered, fissured, flaky. Branchlets pubescent, deeply excavated under each leaf. Leaves spirally arranged, sessile, peltately attached, obovate, scale-like, concave, acute, rounded or truncate at base, 1–1.5 mm long, to 1 mm wide, pubescent on inner surface, 3–veined, midvein only visible, oil glands obscure. Inflorescence a few flowered dense terminal head; flowers single; rachis pubescent, growing out after anthesis; bracts semipersistent, ovate acuminate, to 2 mm long, striate, partly pubescent; bracteoles semipersistent, ovate, about 1.5 mm long, keeled ciliate. Calyx tube turbinate, 1–2 mm long and wide, glabrous; lobes broadly triangular, 1–1.5 mm long, striate with ciliate margins, glabrous. Petals brown, ovate, truncate, not clawed, 2–2.5 mm long, striate with thin ciliate margin. Stamens red, pubescent inside claw; claw 2–3 mm long; filaments 8–14 attached to margin of each claw near apex, free part to 7 mm

long. Style 9–12 mm long, glabrous, (aborted in male flowers); stigma small. Ovary about 1 mm long, woolly above. Fruit angular, flattened above, to 4 mm long, 6 mm wide, orifice 1–1.5 mm diam., calyx lobes absent, few in dense globose head about 1 cm diam. **Map 3.**

Northern Territory: sandstone areas of Arnhem Land.

Specimens examined. Northern Territory: 13° 07'S, 133° 09'E, Jul 1972, *Lazarides* 7610. (Type: BRI, holo; CANB, DNA, NSW, iso); Deaf Adder Gorge, Feb 1977, *Fox* 2506 (BRI, DNA), & 2518 (BRI, DNA), & Jul 1978, *Dunlop* 4989 (DNA); 2–3 miles [3–5 km] N of El Sharana, Jan 1973, *Martenz & Schodde* AE585 (BRI, DNA); 13° 06'S, 132° 56'E, Jul 1978, *McGillivray* 3944 & *Dunlop* (BRI, DNA).

4. *M. tamariscina* Hooker in Mitchell, Trop. Aust. 262 (1848); Benth., Fl. Aust. 3:163 (1867); Carrick & Chorney, J. Adelaide Bot. Gard. 1(5):302 (1979). Type: Belyando R., about 21° 19'S, Aug 1846, *Mitchell* (K, n.v.).

Shrub or small tree to 7 m high. Bark compact, layered, papery. Branchlets glabrous, deeply excavated under leaves. Leaves spirally arranged, sessile, peltately attached, circular to ovate, scale-like, concave, obtuse to acuminate, rounded at the base, 0.5–3 mm long, glabrous sometimes with ciliate margins, 1–5 veins, obscure; oil glands usually obscure. Inflorescences usually an open, few to many flowered terminal spike; flowers single or in triads, rachis pubescent, growing out before anthesis; bracts, broadly triangular, about 1.5 mm long, striate with ciliate margins, deciduous; bracteoles filiform, tomentose. Calyx tube campanulate, about 1.5 mm long and wide, glabrous; lobes semicircular about 0.5 mm long, striate, glabrous with minutely ciliate margins. Petals white, almost circular, shortly clawed about 1.5 mm long. Stamens white, glabrous; claw 3–4.5 mm long; filaments 8–15 attached near apex of each claw, free part to 4 mm long. Style 5–8 mm long (reduced in male flowers) glabrous; stigma small. Ovary about 0.8 mm long, tomentose at apex. Fruit truncate conical to nearly spherical, 2–3 mm long, 3–4 mm diam., orifice 1–2 mm, calyx lobes sometimes persistent but not enlarged, few to many in open or dense spikes. **Map 4.**

North-central Queensland.

Selected specimens. Queensland. NORTH KENNEDY DISTRICT: 18 miles [29 km] ENE of Torrens Creek, Jun 1953, *Perry* 3585 (BRI). MITCHELL DISTRICT: Jericho, Jul 1934, *Blake* 6819 (BRI); Barcardine, Nov 1943, *White* 12379 (BRI); 27 km E of Aramac, Jul 1975, *Beeston* 1114C (BRI).

5. *M. irbyana* R. Baker, Proc. Linn. Soc. N.S.W. 37:587. Pl. 64 (1913). Type: New South Wales: Lawrence Road, Casino, *L. G. Irby* (NSW).

Shrubs or small trees to 8 m high. Bark layered, papery, spongy and loose. Branchlets shortly puberulous or glabrous, shallowly excavated at nodes. Leaves scattered or spirally arranged, sessile, peltately attached, elliptical to ovate, concave becoming flattened towards apex, acute to acuminate, rounded or truncate at base, 2.5–4.5 mm long, glabrous sometimes with ciliate margins 7–9 veined, often obscure, oil glands mostly obscure. Inflorescence a terminal or subterminal, few to many flowered dense spike, flowers mostly in triads, rachis thinly pubescent, growing out before anthesis, bracts broadly triangular, to 4 mm long, striate, glabrous, deciduous; bracteoles ovate, about 1.5 mm long, keeled, deciduous. Calyx tube turbinate to campanulate, rarely urceolate, 1.5–2.5 mm long and wide, glabrous; lobes semicircular with narrow margins, about 0.5 mm long, glabrous. Petals white or tinged pink, nearly circular, claw short or absent, about 1.5 mm long. Stamens white, glabrous; claw 2.5–4 mm long, filaments 6–11 attached to margin of each claw near apex, free part to 4 mm long. Style 7–9 mm long (reduced in male flowers), glabrous; stigma capitate. Ovary about 1 mm long, tomentose at apex. Fruit campanulate to nearly spherical, 3–4 mm long and wide, orifice about 1–2 mm diam., calyx lobes semipersistent but not enlarged, usually in open spikes. **Map 5.**

Eastern Australia: south-eastern Queensland and north-eastern New South Wales.

Selected specimens. Queensland. MORETON DISTRICT: 19 km SSE of Rosewood, Oct 1971, *Durrington* 619 (BRI); Approx. 27° 46'S, 153° 01'E, Nov 1969, *Blake* 23119 (BRI); near Jimboomba, Aug 1931, *White* 7865 (BRI). New South Wales: Casino, in 1917, *Irby* (BRI, NSW).

6. *M. pallescens* Byrnes, sp. nov. (see p.74).

Shrubs, usually virgate, to 3 m high. Bark hard, furrowed. Branchlets glabrous, shallowly to moderately excavated at nodes. Leaves scattered, sessile, peltately attached, obovate to narrowly triangular, recurved, obtuse to acuminate, truncate or rounded and concave at base, 1–5 mm long,

glabrous, 3–5 veins, obscure, oil glands usually obscure. Inflorescence a few to many flowered terminal or subterminal spike; flowers mostly in triads, rachis puberulous growing out before anthesis, bracts deciduous, ovate-acuminate, to 3.5 mm long, striate; bracteoles narrowly ovate, about 1 mm long, keeled. Calyx tube campanulate, 1–2 mm long, 1–1.5 mm wide, puberulous to glabrous; lobes semicircular about 0.5 mm long, glabrous, usually 3–veined, margins ciliolate. Petals white usually with pink midline, broadly ovate, with or without short claw, about 1.5 mm long. Stamens mauve to pink, fading with age, glabrous; claw 2–3 mm long; filaments 7–9 attached to upper margin of each claw; free part to 5 mm long. Style to 8 mm long (reduced in male flowers); stigma capitate. Ovary *ca* 1 mm long, tomentose at apex. Fruit ovoid to nearly spherical, 3–5 mm long and wide, orifice 1–2 mm diam., calyx lobes persistent but not enlarged; few to many usually in dense spikes. **Map 6.**

Queensland: inland areas of south-eastern region.

Queensland. MORETON DISTRICT: Indooroopilly (cultivated), Nov 1979, *Byrnes* 3940 (Type BRI, holo; CANB, NSW, iso). DARLING DOWNS DISTRICT: 27 km S of Hannaford, Nov 1971, *Stevenson* (BRI); Miles, Sep 1970, *Trapnell & Williams* (BRI) & May 1960, *Blake* 21274 (BRI); Inglewood, Nov 1922, *White, Doggrell & Smith* (BRI); Kogan, Jul 1973, *Hockings* (BRI); 10.3 miles [16 km] E of Tara, May 1961, *Smith* 11346 (BRI); Enniskillen, Nov 1943, *White* 12378 (BRI).

APPENDIX

Diagnoses and new combinations for names used in the key (p.67). The species are numbered as they are in the key.

3. *Melaleuca punicea* Byrnes sp. nov., affinis *M. tamariscinae* Hooker capitulis paucifloris densis staminibus puniceis pubescentibus intra unguem differt. **Typus:** *Lazarides* 7610 (BRI, holo; CANB, DNA, NSW, iso).
6. *Melaleuca pallescens* Byrnes, sp. nov. affinis *M. tamariscinae* Hooker foliis ad apicem recurvatis, staminibus paucioribus malvinis primo differt. **Typus:** *Byrnes* 3940 (BRI, holo; CANB, NSW, iso).
10. *Melaleuca biconvexa* Byrnes, sp. nov. affinis *M. cheelii* C. White foliis utroque costae latere convexis, infra carinatis. **Typus:** *Story* 6681 (NSW, holo; BRI, iso).
M. pauciflora auct. non Turcz.; Benth., Fl. Austr. 3:139 (1867).

Turczaninov based *M. pauciflora* on *Gilbert* 40, a collection from Western Australia, Benth. did not see this collection but, evidently believing it had come from eastern Australia, based his description on *McArthur* 221 which he considered agreed with Turczanov's description. *M. pauciflora* Turcz. differs from the species from New South Wales described by Benth. in having axillary, not terminal, inflorescences and only seven staminal filaments in each bundle. The syntypes of *M. leptoclada* Benth. (collections of Brown and Drummond from Western Australia) match the type of *M. pauciflora* at Kew and the name must be treated as a synonym of *M. leptoclada*.

13. *Melaleuca tortifolia* Byrnes, sp. nov. affinis *M. cheelii* C. White foliis ovatis longioribus vulgo tortis, spicis densis calyce villosa, stigmatibus non capitatis differt. **Typus:** *Williams* s.n. (NE 39994a, holo; NSW, iso).
16. *Melaleuca densispicata* Byrnes, sp. nov. affinis *M. adnatae* Turcz. foliis attenuatissimis nec recurvatis, calycis tubo non pustulato, rhacidi inflorescentiae crescente post florescentiam differt. **Typus:** *Everist* 872 (BRI, holo).

In his presidential address to the Botany Section of ANZAAS in 1937, Cheel referred to this species as *M. adnata* var. *aspera*, but published no description.

23. *Melaleuca arnhemica* Byrnes, sp. nov. affinis *M. magnificae* Specht florum partibus omnibus parvioribus et staminibus paucis differt. **Typus:** *Craven* 5926 (BRI, holo; CANB, iso).
26. *Melaleuca brassii* Byrnes, sp. nov. affinis *M. symphyocarphae* F. Muell. bracteolis bilobis, petalis rubris, staminibus rubris pluribus differt. **Typus:** *Brass* 5690 (BRI, holo).
27. *Melaleuca cornucopiae* Byrnes, sp. nov. affinis *M. salignae* Schauer inflorescentiis longioribus valde centripedis calycis lobis carentibus. **Typus:** *Dunlop* 4030 (BRI, holo; DNA, iso).
32. *Melaleuca nervosa* (Lindley) Cheel
f. *latifolia* Byrnes, form. nov. affinis *M. nervosae* f. *nervosae* foliis distinctius obovatis latioribus usque 40 mm latis. **Typus:** *Blake* 16344 (BRI, holo).
f. *pendulina* Byrnes, form. nov. affinis *M. nervosae* f. *nervosae* ramulis pendulis, foliis angustis tenuibus differt. **Typus:** *Brass* 19778 (BRI, holo).
34. *Melaleuca stenostachya* S. T. Blake var. *pendula* Byrnes, var. nov. affinis *M. stenostachyae* var. *stenostachyae* cortice papyraceo, ramulis pendulis, internodiis longioribus et foliis longioribus latioribusve differt. **Typus:** *Webb & Tracey* 5989 (BRI, holo).
35. *Melaleuca sericea* Byrnes, sp. nov. affinis *M. stenostachyae* S. T. Blake inflorescentiis brevioribus subterminalibus staminum ungue longiore et indumento ramulorum, foliorum, calycis loborum et fructuum persistente differt. **Typus:** *Lazarides* 5133 (BRI, holo; CANB, iso).
39. *Melaleuca viridiflora* Sol. ex Gaertner
var. *canescens* Byrnes, var. nov. affinis *M. viridiflorae* var. *viridiflorae* foliis canescentibus indumento expilis persistentibus appressis differt. **Typus:** *Pedley* 1843 (BRI, holo).
var. *glabra* (C. White) Byrnes, comb. nov. Based on *M. cunninghamii* Schauer var. *glabra* C. White, J. Arnold Arb. 23:47 (1942). **Type:** *Brass* 8485 (BRI, holo).
var. *attenuata* Byrnes, var. nov.; a *M. viridiflorae* var. *viridiflorae* foliis angustioribus minus quam 2.5 cm latis, a var. *angustifoliae* (L.f.) Byrnes foliis tenuibus sed rigentibus plerumque longioribus plus quam 10 cm longis, inflorescentis plerumque glabris distinguitur. **Typus:** *Moriarty* 9 (BRI, holo).
var. *angustifolia* (L.f.) Byrnes, comb. nov. Based on *M. leucodendron* (L.) L. var. *angustifolia* L.f., Suppl. Pl. 342 (1781). **Type:** New Caledonia, *Forster* (LINN, holo, n.v.; BRI, microfiche).
M. quinquerteria (Cav.) S. T. Blake, Proc. Roy. Soc. Qd 69:76 (1958). For further synonymy see Blake, Contr. Qd Herb. 1:28 (1968).
41. *Melaleuca styphelioides* Smith var. *squamophloia* Byrnes, var. nov.; a *M. styphelioide* var. *styphelioide* cortice squamato lobis calycis longioribus staminibus pluribus. **Typus:** *K. R. Kerr* s.n., Dec 1949 (BRI, holo; CANB, NSW, iso).

42. *Melaleuca viminalis* (Sol. ex Gaertner) Byrnes, comb. nov. Based on *Metrosideros viminalis* Sol. ex Gaertner, Fruct. et Semin. 1:181, t. 34, f. 4 (1788). **Type:** Endeavour River, *Solander* (K, n.v.).
Callistemon viminalis (Sol. ex Gaertner) G. Don ex Loudon, Hort. Brit. 197 (1830).
C. speciosus auct. non DC.; Bailey Qld Flora 2:594 (1900).

var. **minor** Byrnes, var. nov.; affinis *M. viminali* var. *viminali* foliis angustioribus calyce villosio staminorum ungue paene nullo distinguitur. **Typus:** *Hubbard* 3828 (BRI, holo).

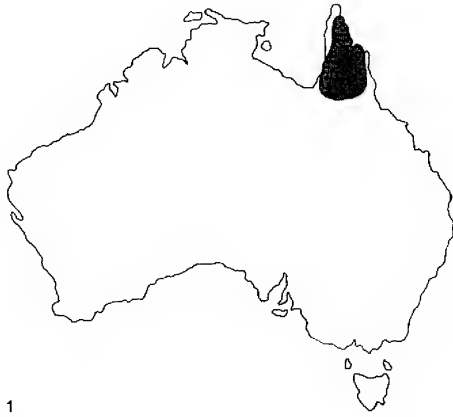
Although *Metrosideros viminalis* was described from Australian material, it was not considered by Bentham in *Flora Australiensis*. It was referred to *Callistemon* by Don and later by Cheel (Svensk. Vet.-Acad. Handl. n.s. 52(10) 16. 1919). The stamens are definitely in bundles, particularly so in *M. viminalis* var. *viminalis*, and it is best referred to *Melaleuca*.

48. *Melaleuca kunzeoides* Byrnes, sp. nov. affinis *M. sieberi* Schau. floribus pedicellatis fructibus parietibus tenuibus differt. **Type:** *Sandecoe* s.n., 13 April 1981 (BRI, holo; CANB, K, NSW, iso).
54. *Melaleuca parvistaminea* Byrnes, sp. nov. affinis *M. ericifoliae* Sm. glandibus foliorum paucioribus filamentis staminorum paucioribus (3–5) conjunctis in ungue brevioribus differt. **Typus:** *Muir* 3549 (MEL, holo; AD, iso).

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Maps 1. *Melaleuca foliolosa*. 2. *M. minutifolia*. 3. *M. punicea*. 4. *M. tamariscina*. 5. *M. irbyana*. 6. *M. pallescens*.